



**O'BRIEN & GERE**  
ENGINEERS, INC.

505753 0012



RCRA

November 5, 1993

Ms. Jo Hanson  
Monsanto Company  
800 North Lindbergh Blvd.  
St. Louis, MO 63167

Re: Monsanto John F. Queeny Plant  
Building FF Phase II Investigation  
File: 2600.024#2

Dear Ms. Hanson:

O'Brien & Gere Engineers, Inc. has completed the Phase II Investigation at Building FF at the Monsanto Company (Monsanto) John F. Queeny Plant. The Phase II Investigation, which included soil and ground water sampling, was completed to further delineate affected soil and ground water observed during the Phase I Investigation, which was conducted to assess the effectiveness of previous remediation efforts at the site. The Phase I analytical results are summarized in Attachment A.

During the Phase II Investigation, nine ground water samples and twelve soil samples were collected from the site and analyzed for tetrachloroethene (PCE) and trichloroethene (TCE) (Figures 1, 2, and 3). Ground water samples were collected using a GEOPROBE sampling device. Two samples were collected from each ground water sampling location. One sample from each location was analyzed for TCE and PCE using a field gas chromatograph (GC). Three duplicate ground water samples were submitted to Savannah Laboratories and Environmental Services, Inc. (Savannah Laboratories) for TCE and PCE analysis by USEPA SW 846 Method 8240. The ground water sample analytical results are summarized in Table 1.

Soil samples were collected from six soil borings completed at the site. One soil boring was advanced using GEOPROBE sampling equipment, and the remaining five soil borings were advanced using conventional hollow stem auger techniques. Two soil samples were collected from each soil boring: one sample was collected from the upper interval of each soil boring (two to four feet below grade), and one sample was collected from the interval exhibiting the highest concentration based on field screening with a photoionization detector (PID). The soil samples were submitted to Savannah Laboratories for PCE and TCE analysis by USEPA SW 846 Method 8240. The soil sample analytical results are summarized in Table 2.

Figures 1, 2, and 3 depict the estimated concentration contours for shallow soil, deep soil, and ground water, respectively, based on the analytical results. The ground water concentration contours suggest that two distinct areas of higher concentrations exist at the site, one south of the alley, which runs east to west and is located north of the former Building FF location, and one north of the alley. However, limited ground water data has been collected north of the alley. Furthermore, the concentrations detected in the ground water north of the alley suggest that constituents may exist in the soil. Currently, soils have not been investigated north of the alley. Based on the available analytical data, O'Brien & Gere Engineers, Inc. is unable to confidently identify the limits of affected soil and/or ground water.

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Also during the Phase II Investigation, ground water level measurements were collected in four of the existing wells at the John F. Queeny Plant, REC-1, MW#3, MW#4, and MW#19. Using the data obtained from these wells, O'Brien & Gere Engineers, Inc. attempted to assess ground water flow direction across the investigation area within the vicinity of Building FF. However, due to the lack of ground water data north of the alley, O'Brien & Gere Engineers, Inc. is unable to assess accurate ground water flow in this area.

To fill the apparent data gaps noted above and more adequately assess the site, O'Brien & Gere Engineers, Inc. proposes additional investigations to determine the topography of bedrock in the area (and potential nonaqueous phase liquids [NAPLs] in the subsurface), ground water flow direction across the site, and soil conditions. Bedrock may be investigated using a network of cone penetrometers. Following advancement of the penetrometers to the bedrock, temporary piezometers may be installed in the penetrometer borings to provide for ground water level monitoring. The piezometers may be screened at different intervals to allow investigation of the presence of NAPL layers across the site. After the piezometers have been installed, following a suitable recovery period, ground water level measurements could be obtained and ground water samples could be collected from each piezometer.

Following completion of the tasks summarized above and review of the ground water analytical results, O'Brien & Gere Engineers, Inc. proposes that additional soil investigations be completed north of the alley in locations dictated by the ground water analytical results. During advancement of the soil borings, soil samples may be collected for chemical analysis as well as geotechnical analysis. Geotechnical data obtained will be useful in evaluating constituent transport at the site.

O'Brien & Gere Engineers, Inc. appreciates the opportunity to be of continued service to Monsanto. If you have any questions or comments, please do not hesitate to call me at any time.

Very truly yours,

O'BRIEN & GERE ENGINEERS, INC.

  
Julie J. Lowe  
Project Engineer

JJL:bah

Attachments

cc: Christopher G. Dorow - Monsanto Company (w/attachments)  
Dean L. Palmer, P.E. - O'Brien & Gere Engineers, Inc.

2600.024:HANS1105.LTR

**Table 1**

**Monsanto Company  
John F. Queeny Plant  
Building FF Phase II Investigation**

**Summary of Groundwater Analytical Results**

| Parameter                          | GP22 | GP23 | GP24 | GP25   | GP25D  | GP26  | GP26D** | GP27 | GP28 | GP29 | GP29D | GP30 |
|------------------------------------|------|------|------|--------|--------|-------|---------|------|------|------|-------|------|
| Depth to Screen (ft)               | 9    | 21   | 21   | 24     | 24     | 21    | 21      | 21   | 23   | 21   | 21    | 21   |
| Depth to Groundwater in Probe (ft) | 7.3  | 10.8 | 19.5 | 11.3   | 11.3   | 18.8  | 18.8    | 16.2 | 16.3 | 12.3 | 12.3  | 11.7 |
| PCE (ppb)                          | ND*  | 394  | 3    | 373202 | 160000 | 7388  | 3200J   | 1    | 303  | ND   | ND    | 1    |
| TCE (ppb)                          | ND   | 35   | 1    | 11324  | 5900   | 45711 | 14000   | 6    | 33   | ND   | ND    | ND   |

**NOTES**

\* ND = Not Detected above the method detection limit.

\*\* GP26D also exhibited the following concentrations: Cis-1,2-Dichloroethene - 10000J; Chloroform - 2100J; Toluene - 370000; Chlorobenzene - 10000J.

All concentrations in ppb. J = Estimated quantity below the method detection limit.

*lot of difference*

**Table 2**

**Monsanto Company  
John F. Queeny Plant  
Building FF Phase II Investigation**

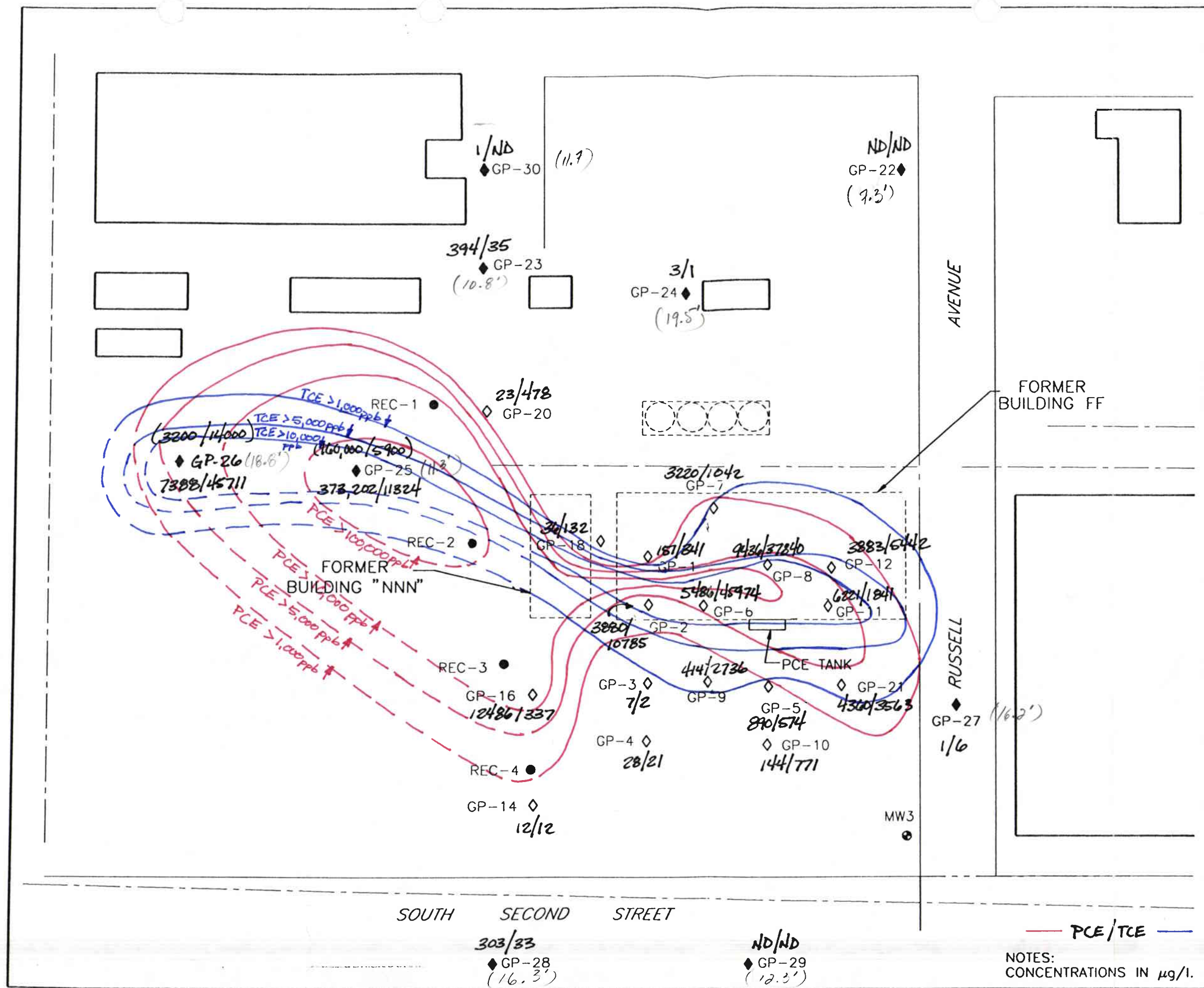
**Summary of Soil Analytical Results**

| Parameter  | SB-7 | SB-7 | SB-8 | SB-8 | SB-9 | SB-9  | SB-10 | SB-10 | SB-11 | SB-11 | SB-12 | SB-12 |
|------------|------|------|------|------|------|-------|-------|-------|-------|-------|-------|-------|
| Depth (ft) | 2-4  | 6-8  | 3-5  | 9-11 | 3-5  | 11-13 | 2-4   | 6-8   | 5-7   | 9-11  | 0-4   | 4-6   |
| PCE (ppb)  | ND*  | 34   | ND   | ND   | 30   | 9.2   | ND    | ND    | ND    | ND    | ND    | ND    |
| TCE (ppb)  | ND   | 39   | ND   | ND   | ND   | ND    | ND    | ND    | ND    | ND    | ND    | ND    |

**NOTES**

\* ND = Not Detected above the method detection limit.

FIGURE 1



**LEGEND**

- REC-2 ● EXISTING PRODUCT RECOVERY WELL AND ID
- MW3 ● EXISTING GROUND WATER MONITORING WELL AND ID
- GP-4 ◇ PHASE I GEOPROBE SAMPLE APPROXIMATE LOCATION AND ID
- GP-22 ◇ PHASE II GEOPROBE SAMPLE LOCATION AND ID

MONSANTO COMPANY  
J. F. QUEENY  
BUILDING FF  
PHASE II INVESTIGATION  
GROUND WATER  
CONCENTRATION CONTOURS

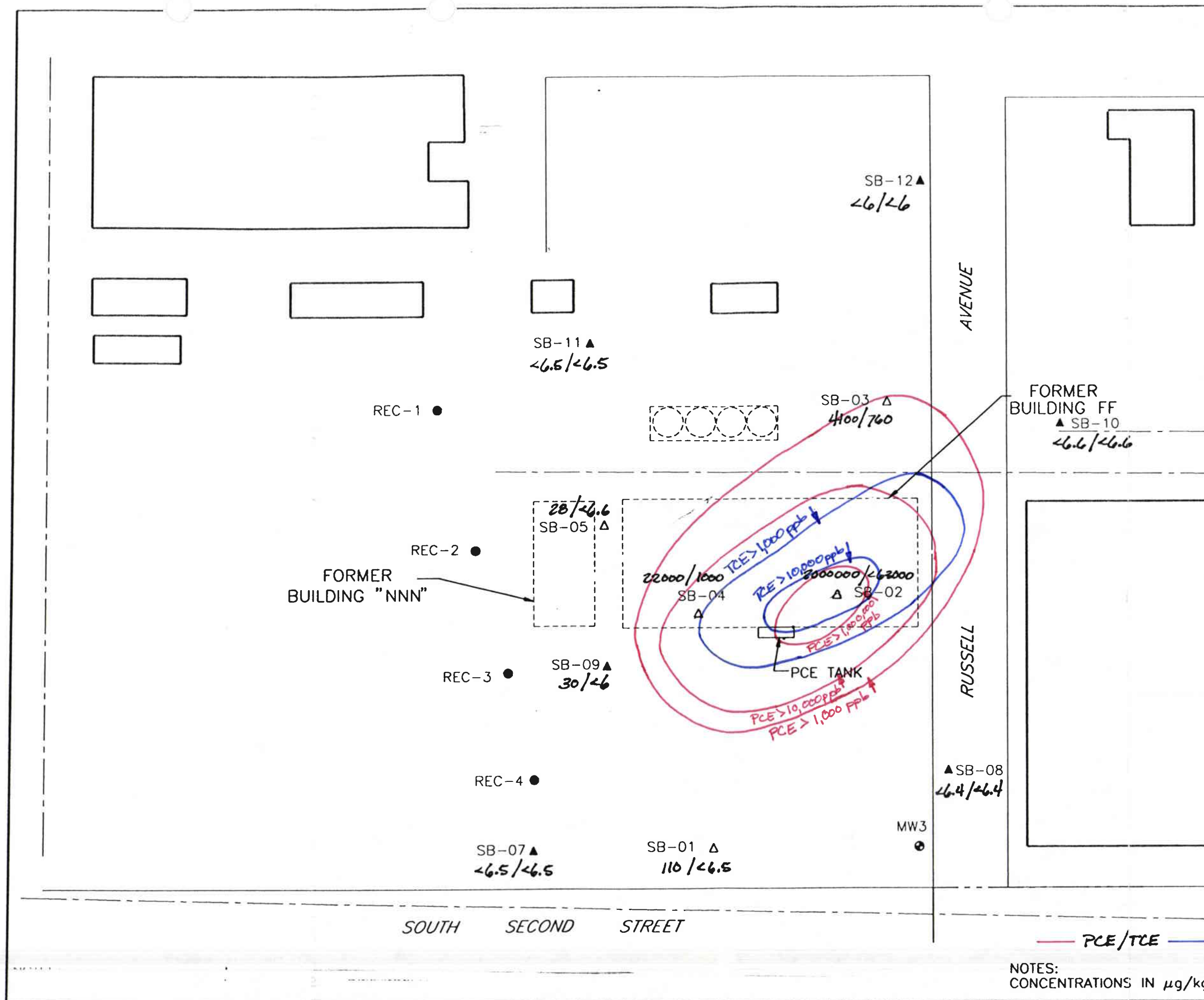
1" = 40'-0"

FILE NO. 2600.024-05F



NOTES:  
CONCENTRATIONS IN  $\mu\text{g/l}$ .

FIGURE 2



**LEGEND**

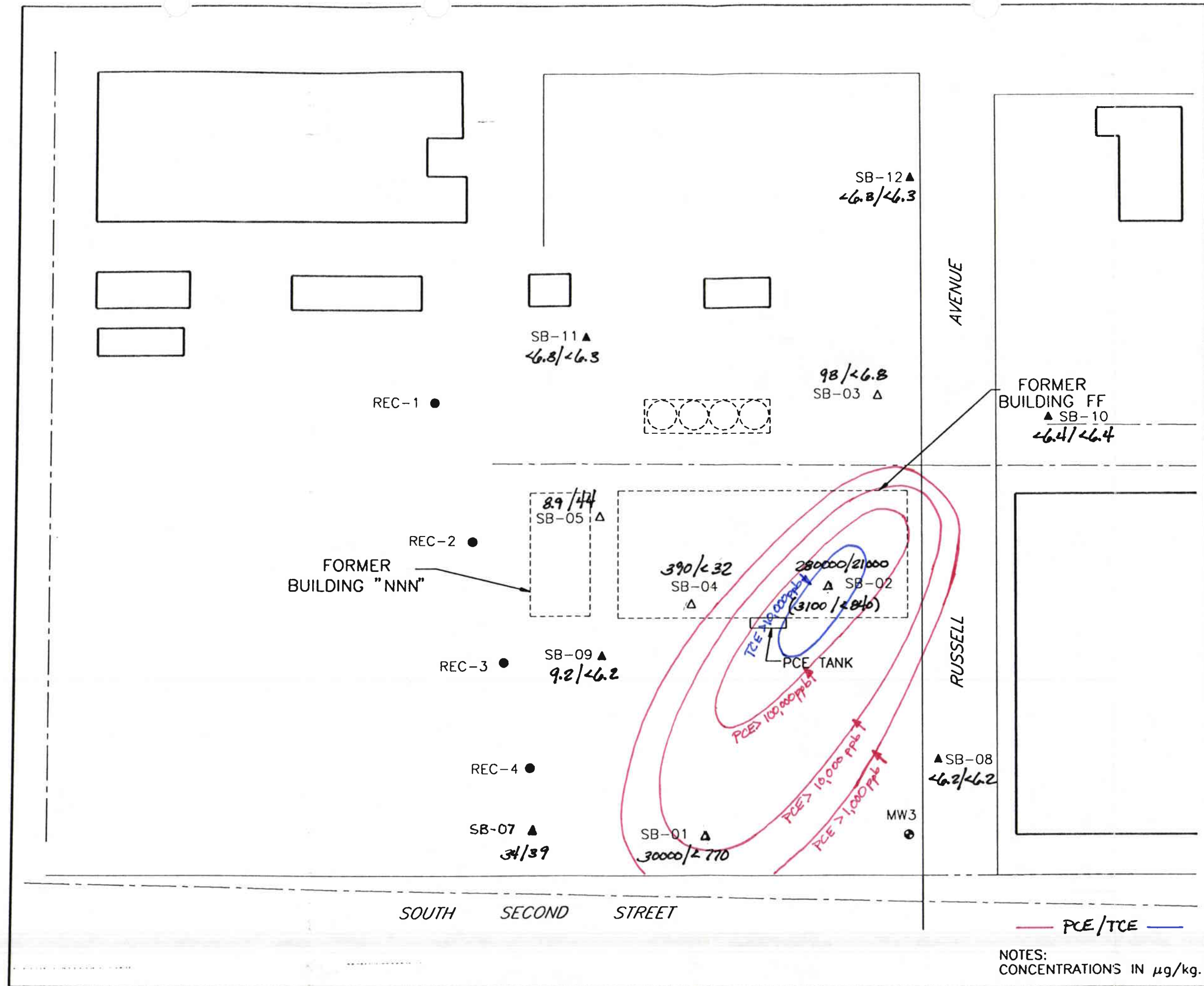
- REC-2 ● EXISTING PRODUCT RECOVERY WELL AND ID
- MW3 ● EXISTING GROUND WATER MONITORING WELL AND ID
- SB-12 ▲ PHASE II SAMPLE LOCATION AND ID
- SB-03 ▲ PHASE I SOIL SAMPLE APPROXIMATE LOCATION AND ID

MONSANTO COMPANY  
J. F. QUEENY  
BUILDING FF  
PHASE II INVESTIGATION  
SHALLOW SOIL  
CONCENTRATION CONTOURS  
(2' - 4')  
1" = 40'-0"

FILE NO. 2600.024-06F



FIGURE 3



**LEGEND**

- REC-2 ● EXISTING PRODUCT RECOVERY WELL AND ID
- MW3 ● EXISTING GROUND WATER MONITORING WELL AND ID
- SB-08 ▲ PHASE II SAMPLE LOCATION AND ID
- SB-03 ▲ PHASE I SOIL SAMPLE APPROXIMATE LOCATION AND ID

MONSANTO COMPANY  
J. F. QUEENY  
BUILDING FF  
PHASE II INVESTIGATION  
DEEP SOIL  
CONCENTRATION CONTOURS  
(8' - 12')  
1" = 40'-0"

FILE NO. 2600.024-07F

NOTES:  
CONCENTRATIONS IN  $\mu\text{g}/\text{kg}$ .

Table 2

Monsanto Company  
J.F. Queeny Plant  
Building FF  
Phase I Investigation

**GEOPROBE GROUNDWATER SAMPLING RESULTS**  
(ug/L)

| Sample I.D. | Parameter       |                   |
|-------------|-----------------|-------------------|
|             | Trichloroethene | Tetrachloroethene |
| GP1         | 341             | 151               |
| GP2         | 10,785          | 3,880             |
| GP3         | 2               | 7                 |
| GP3 DUP     | 2               | 7                 |
| GP4         | 21              | 28                |
| GP5         | 574             | 890               |
| GP6         | 45,974          | 5,486             |
| GP7         | 1,042           | 3,220             |
| GP8         | 37,840          | 9,416             |
| GP9         | 2,736           | 414               |
| GP10        | 771             | 144               |
| GP11        | 18,414          | 6,221             |
| GP12        | 5,442           | 3,883             |
| GP14        | 12              | 12                |
| GP16        | 337             | 12,486            |
| GP18        | 132             | 36                |
| GP20        | 478             | 23                |
| GP21        | 3,563           | 4,360             |

NOTE:

1) ug/L is equivalent to parts per billion (ppb)

Table 3

Monsanto Company  
J.F. Queeny Plant  
Building FF  
Phase I Investigation

WELL SAMPLING RESULTS  
(ug/L)

| Sample I.D. | Parameter       |                   |
|-------------|-----------------|-------------------|
|             | Trichloroethene | Tetrachloroethene |
| REC-1       | <2,500          | 61,000            |
| REC-2       | <5,000          | 150,000           |
| REC-3       | <5              | 36                |
| REC-4       | 570             | 3,400             |
| MW-3        | 250             | 250               |
| DUP         | 380             | 3,300             |

NOTE:

1) ug/L is equivalent to parts per billion (ppb)

Table 4

Monsanto Company  
J.F. Queeny Plant  
Building FF  
Phase I Investigation

SUBSURFACE SOIL SAMPLING RESULTS  
(ug/kg)

| Sample I.D.        | Parameter       |                   |
|--------------------|-----------------|-------------------|
|                    | Trichloroethene | Tetrachloroethene |
| SB-1 (2'-4')       | <6.5            | 110               |
| SB-1 (10'-12')     | <770*           | 30,000            |
| SB-2 (2'-4')       | <63,000*        | 2,000,000         |
| SB-2 (8'-10')      | 21,000*         | 280,000           |
| SB-3 (6.5'-8.5')   | 760*            | 4,100             |
| SB-3 (10.5'-12.5') | <6.8            | 93                |
| SB-4 (2'-4')       | 1,000*          | 22,000            |
| SB-4 (8'-10')      | <32             | 390               |
| SB-5 (2.5'-4.5')   | <6.6            | 28                |
| SB-5 (10.5'-12.5') | 44              | 8.9               |
| SB-6 (2'-4') DUP   | <840*           | 3100              |

\* Due to the high concentration of PCE in the sample,  
a high level extraction was employed which  
increased reported quantitation limits.

NOTE:

1) ug/kg is equivalent to parts per billion (ppb)